

Claims

1. A membrane structure comprising a tubular porous ceramic monolith having at least four tubular conduits formed within the monolith with a zeolite membrane formed on the internal surface of the conduits the zeolite membranes having an internal diameter of 5 to 9 millimetres and the ceramic monolith having an outer diameter of 20 to 25 millimetres.
2. A structure as claimed in claim 1 in which the zeolite membranes have a diameter of 6.4 millimetres.
3. A structure as claimed in claim 1 or 2 in which the ceramic monolith has an outer diameter of 20mm.
4. A structure as claimed in any one of claims 1 to 3 in which the porous ceramic monolith is formed of a sintered ceramic powder of alpha alumina, titania or zirconia.
5. A membrane structure as claimed in any one of claims 1 to 4 in which there are from 4 to 7 tubular conduits
6. A membrane structure as claimed in any one of claims 1 to 5 in which the porous support has an average pore size of 0.01 to 2,000 microns
7. A membrane structure as claimed in any one of claims 1 to 5 in which the porous support has an average pore size of 1 to 20 microns.
8. A membrane structure as claimed in any one of the preceding claims in which the zeolite membrane is formed by a process which comprises deposition or crystallisation from a growth medium onto the ceramic monolith.

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9. A membrane structure as claimed in claim 8 in which the porous support is contacted with the growth medium by contacting the inner surface of the tubular conduits with the growth medium.

5 10. A membrane structure as claimed in claim 9 in which the porous support is pre-treated with a zeolite initiating agent.

10 11. A membrane structure as claimed in claim 10 in which the zeolite initiating agent is a cobalt, molybdenum or nickel oxide or particles of a zeolite.

12. A membrane structure as claimed in claim 10 in which the zeolite initiating agent is a silicic acid or polysilicic acid.

15 13. A membrane structure as claimed in any one of claims 10 to 12 in which the porous ceramic monolith is treated with the zeolite initiating agent by a process in which a liquid suspension of powder of the zeolite initiation agent is formed and the liquid suspension contacted with the porous support to deposit the zeolite initiation agent on the support.

20 14. A membrane structure as claimed in any one of the preceding claims in which after formation the membrane is treated with a surface modifying agent which cross links with the zeolite membrane to form a membrane with substantially no defects.

25 15. A membrane structure as claimed in claim 14 in which the surface modifying agents is silicic acid or an alkyl silicate.

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